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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
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| 10/698,028 | 10/31/2003 | David Sikharulidze | 1509-467 | 7131 |

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EXAMINER

HON, SOW FUN

| ART UNIT | PAPER NUMBER |
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1772

DATE MAILED: 08/02/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/698,028

Applicant(s)

SIKHARULIDZE, DAVID

Examiner

Sow-Fun Hon

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on ____.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-27 is/are pending in the application.
- 4a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 17-27 is/are allowed.
- 6) ☒ Claim(s) 1-16 is/are rejected.
- 7) ☐ Claim(s) ____ is/are objected to.
- 8) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 02 April 2004 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. ____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 04/02/04.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. ____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: ____.

DETAILED ACTION

Priority

1. Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. Claims 1-13,16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford (US 5,956,113) in view of Bryan-Brown (GB 2 324 620A).

Regarding claim 1, Crawford teaches a bistable liquid crystal display device comprising: two cell walls enclosing a layer of a composition comprising liquid crystal material and solid particles (silica) dispersed therein (column 6, lines 50-60) which are finely divided (at a voltage value great enough to break the hydrogen bonds when transitioning) (column 6, lines 60-65); at least one electrode on each of said cell walls for applying an electric field across at least some of said liquid crystal material (electric field applied between the indium tin oxide layers) (column 3, lines 40-50); and a first surface alignment on an inner surface of one of said walls for inducing adjacent molecules of said liquid crystal to adopt a first orientation (column 3, lines 55-65), whereby said liquid crystal will adopt a first stable molecular configuration in response to a pulse of a unidirectional electric field of suitable magnitude and duration via said electrodes (column

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4, lines 35-45). Crawford discloses prior art which teaches a nematic liquid crystal material (column 1, lines 52-53). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used nematic liquid crystal material in order to obtain the display characteristics of nematic liquid crystal. Crawford teaches that the cell walls, polymer sheets 20 in Fig. 2(b) (column 3, lines 50-55) which are translucent (not opaque) due to reduced haze (column 4, lines 1-10).

Crawford fails to teach a second surface alignment on an inner surface of the other of said cell walls for inducing adjacent molecules of said liquid crystal material to adopt a second orientation which is different from said first orientation.

Bryan-Brown teaches a liquid crystal device wherein the first and second alignment directions are orthogonal (abstract) and hence different from each other, which provides the liquid crystal with a twisted arrangement at a higher voltage (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used a second surface alignment on an inner surface of the other cell wall of Crawford, to induce adjacent molecules of the liquid crystal material to adopt a second orientation which is different from the first orientation, in order to obtain a twisted nematic bistable liquid crystal display, as taught by Bryan-Brown.

Regarding claims 2-3, 9-10, Crawford teaches that the particles are silica (column 6, lines 50-60), which are the same used by Applicant (original claim 10). Therefore the silica particles are expected to be capable of triboelectric charging and acquiring charge in suspension with a liquid crystal material.

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Regarding claim 4, Crawford teaches a voltage source which applies a voltage to the substrates, and then removes it (column 6, lines 1-10), which means that there are drive electronics for applying unidirectional electric field pulses to the electrodes.

Regarding claims 5-6, Crawford teaches that the silica particles are Aerosil (column 7, lines 1-3) used by Applicant (specification, page 11, [0026]), which are expected to have a size in the range of 1 to 1000 nm, and of 5 to 50 nm.

Regarding claims 8-7, Crawford teaches that the surface alignments induce planar alignment at substantially 90 degrees to each other (perpendicular to the substrates, column 6, lines 15-20). Therefore in the device of Crawford in view of Bryan-Brown, the first surface alignment induces planar alignment, and the second surface alignment induces homeotropic alignment, being orthogonal to the first surface alignment (Bryan-Brown, abstract).

Claims 9-10 have been discussed above.

Regarding claims 11-13, Crawford teaches that the particles are present in a concentration of 0.5 to 1.0 % by weight (column 6, line 67, column 7, line 1), which overlaps the claimed range of from 0.1 to 25 % by weight, from 1 to 15 % by weight, and from 1 to 5 % of the composition.

Regarding claims 16, Crawford teaches a bistable liquid crystal device comprising: two cell walls enclosing a layer of liquid crystal material (column 6, lines 50-60), at least one of said cell walls being translucent (not opaque with reduced haze, column 4, lines 1-10). Crawford discloses prior art which teaches a nematic liquid crystal material (column 1, lines 52-53). Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used nematic liquid crystal material in order to obtain the display

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characteristics of nematic liquid crystal. Crawford teaches that the silica particles are Aerosil (column 7, lines 1-3) used by Applicant (specification, page 11, [0026]), which are expected to have a size in the range of 1 to 500 nm. Crawford teaches at least one electrode on each of said cell walls for applying an electric field across at least some of said liquid crystal material (electric field applied between the indium tin oxide layers) (column 3, lines 40-50); and a first surface alignment on an inner surface of one of said walls for inducing adjacent molecules of said liquid crystal to adopt a first orientation (column 3, lines 55-65), whereby said liquid crystal will adopt a first stable molecular configuration in response to a pulse of a unidirectional electric field of suitable magnitude and duration via said electrodes (column 4, lines 35-45). Crawford teaches a voltage source which applies a DC voltage to the substrates, and then removes it (column 6, lines 1-10), which means that there are drive electronics for applying unidirectional and hence DC electric field pulses of desired magnitude, polarity and durations to said liquid crystal material. The liquid crystal is nematic and therefore will adopt one of two different stable optical states in response to an electric field of suitable magnitude, polarity and duration being applied, wherein said liquid crystal material will adopt the other of said optical states in response to an electric field of suitable magnitude and duration and opposite polarity being applied, by virtue of its nematic liquid crystal properties.

Crawford fails to teach a second surface alignment on an inner surface of the other of said cell walls for inducing adjacent molecules of said liquid crystal material to adopt a second orientation which is different from said first orientation.

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Bryan-Brown teaches a liquid crystal device wherein the first and second alignment directions are orthogonal (abstract) and hence different from each other, which provides the liquid crystal with a twisted arrangement at a higher voltage (abstract).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used a second surface alignment on an inner surface of the other cell wall of Crawford, to induce adjacent molecules of the liquid crystal material to adopt a second orientation which is different from the first orientation, in order to obtain a twisted nematic bistable liquid crystal display, as taught by Bryan-Brown.

4. Claims 14-15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Crawford in view of Bryan-Brown as applied to claims 1-13, 16 above, and further in view of Thurston (Mechanically Bistable Liquid Crystal Display Structures).

Crawford in view of Bryan-Brown teaches a bistable liquid crystal display device comprising: two cell walls enclosing a layer of a composition comprising nematic liquid crystal material and finely divided solid particles dispersed therein, at least one of said cell walls being translucent; at least one electrode on each of said cell walls for applying an electric field across at least some of said liquid crystal material; a first surface alignment on an inner surface of one of said cell walls for inducing adjacent molecules of said liquid crystal material to adopt a first orientation, and a second surface alignment on an inner surface of the other of said cell walls for inducing adjacent molecules of said cells walls for inducing adjacent molecules of said liquid crystal material to adopt a second orientation which is different from said first orientation, whereby said nematic liquid crystal material will adopt a first stable molecular configuration in response to a pulse of a unidirectional electric field of suitable magnitude and duration via said

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electrodes and will adopt a second stable molecular configuration in response to a similar pulse of opposite polarity, said second configuration being different from said first configuration, as described above.

Crawford in view of Bryan-Brown fail to teach at least one polarizer for distinguishing between different optical states of said liquid crystal, or that the liquid crystal has a pleochroic dye dissolved therein.

Thurston teaches that dissolving (mixing) a pleochroic dye into the liquid crystal provides optical contrast between the vertical and horizontal states, and that vertically transmitted light that is horizontally polarized in the plane is then strongly absorbed by the horizontal state (column 2073a, first paragraph below Fig. 6, teaching at least one polarizer for distinguishing between different optical states of the liquid crystal which has a pleochroic dye dissolved therein).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made, to have used a polarizer with, and dissolved pleochroic dye in the liquid crystal of Crawford in view of Bryan-Brown, in order to obtain a method to distinguish between the different optical states of the liquid crystal.

Allowable Subject Matter


5. Claims 17-27 are allowed. The prior art of record, US 5,956,113 fails to teach or suggest, even in combination with GB 2 324 620A and Thurston (Mechanically Bistable Liquid Crystal Display Structures) to teach the electrophoretically-controlled bistable liquid crystal display devices described. There is no motivation to combine with Bartolino (Polarity sensitive electrooptical response in a nematic liquid-crystal-polymer mixture).

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Any inquiry concerning this communication should be directed to Sow-Fun Hon whose telephone number (571)272-1492. The examiner can normally be reached Monday to Friday from 10:00 AM to 6:00 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Harold Pyon, can be reached on (571)272-1498. The fax phone number for the organization where this application or proceeding is assigned is (703)872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


Sow-Fun Hon

01/07/05